Boston College Environmental Affairs Law Review

Volume 35
Issue 3 *The Greening of the Corporation*

Article 3

1-1-2008

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CHANGING INTELLECTUAL PROPERTY AND CORPORATE LEGAL STRUCTURES TO PROMOTE THE U.S. ENVIRONMENTAL MANAGEMENT AND TECHNOLOGY SYSTEMS INDUSTRY

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Abstract: This Article posits that for the U.S. environmental management and technology industry to enjoy success comparable to the that of the biotechnology and semiconductor industries requires critical examination of current law to enable market-based and regulatory incentives, which would position U.S. industry to compete with equal strength against global competitors in global markets. This Article explains that the legal community, along with the environmental science and engineering disciplines, must guide both growth and market dominance of this industry in the global marketplace. The Article examines three areas of the law critical to the U.S. Environmental Technology Management System (EMTS) industry—intellectual property, tax, and corporate law—and provides examples of how corporate and governmental lawyers can employ current law, absent any new major legislative initiatives, to promote the U.S. EMTS industry to global success and predominance on par with the commercial success of the U.S. semiconductor and biotechnology industries.

INTRODUCTION

Global climate change and sustainable development (GCC/SD) initiatives have already created structural shifts within emissions-intensive industry in the United States and around the globe.[1] Since the 1970s, new environmental protection initiatives in the United States

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[1] *See* U.S. Climate Policy, Climate Change, US EPA, http://www.epa.gov/climate change/policy/index.html (last visited May 1, 2008).

have traditionally started with comprehensive congressional legislation that provides the U.S. Environmental Protection Agency (EPA) and other federal agencies the authority to design and implement regulatory programs meeting specific legislative objectives, and often invites state governments to take the lead in program design and enforcement.[2] In the case of GCC/SD initiatives however, so far new programs and initiatives have come from state and local governments, or from various members of industrial communities. This latter phenomenon forms the basis for this Symposium on *The Greening of the Corporation.* Discussions on this subject often involve the means corporations can employ to improve their environmental performance and the metrics to use to measure that performance. Thus, the conversation usually discusses how existing corporations can reduce waste, electricity consumption, and their carbon footprints. The conversation on measurement metrics includes debates over whether a corporation has actually become greener or whether it is engaging in *greenwashing*.[3] The popular press thus focuses on the increase of environmentally friendly products at traditional retailers,[4] decreased use of energy or increased use of renewables,[5] or how media giants such as NBC have promoted content related to GCC/SD problems,[6] and in so doing, how these corporations have improved their bottom line through resource conservation, and improved market penetration and performance. Similarly, in this Symposium, there are articles that present case studies of green development[7] and that present empirical studies of whether enforcement ef-

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[2] *See, e.g.*, Clean Water Act of 1977, 33 U.S.C. §§ 1251–1387 (2000 & Supp. 2004); Resource Conservation and Recovery Act of 1976, 42 U.S.C. §§ 6901–6992k (2000 & Supp. 2004); Clean Air Act, 42 U.S.C. §§ 7401–7671q (2000).

[3] Greenwashing is the practice of touting programs of environmental progress that cover up or distract from actual practices that are harmful to the environment. The origin of the term appears to be in the title of an article appearing in *Mother Jones* magazine. *See* David Beers & Catherine Capellaro, *Greenwash!*, Mother Jones, Mar.–Apr. 1991, at 38; *see also* Joshua Karliner, The Corporate Planet: Ecology and Politics in the Age of Globalization 168–75 (1997) (providing examples of greenwashing).

[4] *See* Daniel C. Esty & Andrew S. Winston, Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage 7–8 (2006) (discussing efforts by Wal-Mart to increase the number of environmentally friendly products).

[5] *See, e.g.*, Andrew Martin, *In Eco-Friendly Factory, Low-Guilt Potato Chips*, N.Y. Times, Nov. 15, 2007, at A1.

[6] *See* Brian Stelter, *At NBC, the Brand Becomes a Slogan*, N.Y. Times, Nov. 5, 2007, at C1.

[7] *See, e.g.*, Matthew J. Parlow, *Greenwashed?: Developers, Environmental Consciousness, and the Case of Playa Vista*, 35 B.C. Envtl. Aff. L. Rev. 513 (2008) (describing the effect of greenwashing and heightened environmental concerns of real estate developers).

forts work, attempting to analyze how enforcement might be improved.[8]

This Article focuses on another piece of the puzzle, namely how lawyers can effectively harness the legal system to enhance the creativity that lies within corporations towards the growth and dominance of the U.S. Environmental Management and Technology System (EMTS) industry. That creativity takes two forms. The first form is creating and encouraging the innovations that allow corporations to improve their environmental footprints. The second form is creating and fostering conditions in which corporations, or others, can form, adopt, and market EMTSs. EMTSs include business and governmental practices that manage environmental emissions and associated impacts, including greenhouse gas (GHG) emissions, as well as enhance the reuse or recycling of natural resources. The ultimate aims of the reforms urged in this Article are to both integrate the EMTS developments of the United States into the global economy and to make the United States a leader, rather than a follower, in the global marketplace.

Table 1: U.S. EMTS Industry: Evolution from Traditional Components to GCC/SD-Driven Components

Element/Aspect	Traditional	GCC/SD-Driven
Construction/Civil Engineering	Waste-site management, remediation	Renovation/design of existing industrial facilities
Process/Chemical/ Mechanical Engineering	Waste-stream generation, management, control, disposal; recycling services	Design/operation of low-carbon technology equivalents for existing industrial manufacturing/process equipment
Mechanical/Design/ Manufacturing Engineering	Air/water-handling systems; packaging & production design	Life-cycle analysis for product design/development/ production
Engineering Management/ Consulting Services	Process design, permitting, regulatory activities	Management of carbon offset/raw material programs; smart growth planning/implementation

Table 1 summarizes just how fundamental these changes will be to the size, scope, and structure of the U.S. EMTS industry in the years to come. The EMTS industry today is, by and large, a consulting industry whereby corporations—as well as federal and state governments as purchasers—obtain custom-designed engineering project needs on a case-

[8] Robert L. Glicksman & Dietrich H. Earnhart, *Effectiveness of Government Interventions at Inducing Better Environmental Performance: Does Effectiveness Depend on Facility or Firm Features?*, 35 B.C. Envtl. Aff. L. Rev. 479 (2008).

by-case basis.[9] Environmental consultancies manage much of the traditional tasks upon which environmental regulation relies—wastewater and air permitting and management, hazardous-waste collection, transportation, waste-site management—and the design and construction of corporate environmental equipment such as air and water pollutant handling systems or operation and process stream equipment.[10]

In the new low-carbon technology environment of the coming decade, however, the EMTS industry will be called upon to provide different goods and services to corporations both in the United States and abroad. Regulatory requirements and customer demands that oblige manufacturers to upgrade their facilities with low-carbon replacement technology will require not only the design and operation of low-carbon technology equivalents for existing industrial manufacturing and processing equipment, but also new advances in the renovation and redesign of existing industrial facilities in a cost-effective manner. Manufacturing, mechanical, and design engineers will be required to conduct life cycle analyses (LCAs) as part of product designs that consider alternatives for raw materials needs, energy requirements, maintenance, disposal, and product recyclability before actual manufacturing begins.[11] Engineering and corporate managers will totally rethink facility site selection, design, construction, operation, and maintenance, as well as the means by which workers, raw materials, and finished products move to and from their facilities.

Although the United States does have the basic technology lead in many of these areas, global EMTS firms—particularly in the European Union (EU)—have over a decade's head start in applying U.S.-bred technologies into a corporate climate driven by GCC/SD concerns.[12] While the United States has the technical and financial resources to make up ground, the time frame to catch up with its global competitors is measured in months and years, not decades.

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[9] *See supra* tbl.1 (providing a summary of examples of the kinds of services included). *See generally* Envtl. Bus. Int'l, The U.S. Environmental Consulting & Engineering Industry (2007) (providing an overview of the environmental consulting industry).

[10] *See generally* Envtl. Bus. Int'l, *supra* note 9 (discussing the current state of the consulting industry).

[11] *E.g.*, Gary A. Davis et al., Extended Product Responsibility: A New Principle for Product-Oriented Pollution Prevention § 3.4.1 (1997), *available at* http://eerc.ra.utk.edu/clean/pdfs/eprn1-4.pdf.

[12] *See, e.g.*, Nicholas Stern, The Economics of Climate Change: The Stern Review 515 (2007) (discussing the Kyoto Protocol); Select Comm. on Climate Change, House of Lords, The Economics of Climate Change, Second Report of Session 2005–06, at 64–65 (2005) (discussing the United States's opposition to the adoption of the Kyoto Protocol).

In this Article, we argue that global success of the U.S. EMTS industry requires critical assessment of current U.S. legal structures. Such an assessment can lead to helping create market-based and regulatory incentives that promote the U.S. EMTS industry, and also position the industry to compete and win against global competitors in global markets. The Article further posits that it will be the legal community, as the leadership partner with the environmental science and engineering disciplines, which will guide the growth and market dominance of the U.S. EMTS industry in the global marketplace. In making these recommendations, we rely on the success of the semiconductor and biotechnology industries, and the legal structures that helped those American businesses flourish here and abroad.

By advancing incremental changes in existing statutes and regulations, lawyers can harness existing legal systems to position the U.S. EMTS industry for global commercial dominance into the next decade. State, local, and federal governments can similarly implement the changes we recommend between now and the next incoming presidential administration in January 2009. Unlike the now-traditional model for environmental regulation, these recommendations require no major federal legislation.

Three overarching observations fuel and inform our recommendations. First, in making arguments that the legal community should focus on incremental changes to existing statutes and regulations, this Article acknowledges that such incremental change is not a panacea that in and of itself will solve GCC/SD challenges, or guarantee global dominance by the U.S. EMTS industry in the years to come. But, contrary to the arguments by other commentators on this topic,[13] incremental changes in existing legal systems are not a distraction or waste of time for leaders of the EMTS industry, or to those addressing GCC/SD concerns. Incremental changes can provide the needed foundations on which U.S. corporations can expand their EMTS business, just as similar incremental changes established the foundation for the U.S. semiconductor and biotechnology industries in years past. Many of the developments from those industries have proven fruitful or socially beneficial, and overall those industries have produced results that have drastically

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[13] *See, e.g.*, Zygmunt J.B. Plater, *Dealing with Dumb and Dumber: The Continuing Mission of Citizen Environmentalism*, 20 J. ENVTL. L. & LITIG. 9, 62 (2005) (noting that environmental groups "often are bogged down . . . in ineffective Potomac incrementalism, attacking global warming by seeking minor increases in CAFE fuel efficiency standards, without a major vision and ultimately without even incremental success").

changed life for the better, by improving computer technology, as well developing new pharmaceuticals and medical devices.

Second, the proposals presented here accept the scientific and economic reality of the GCC/SD challenge. Regardless of the scientific debates on these issues, the global marketplace, including corporations and governments within the EU and Japan, have already determined that low-carbon industrial technologies and sustainable development will be the dominant global economic drivers in the coming decades.[14] U.S. corporations can be assured that domestic and foreign market demand for sustainable products, and the systems to develop and manufacture them, will create an economic demand of comparable size and scope to the market demand in the semiconductor and biotechnology industries.

Third, corporate and governmental lawyers will play different leadership roles in the exponential growth of the U.S. EMTS industry than in the high-tech, high-growth industries of the past. With regard to the semiconductor and biotechnology industries, lawyers reacted to the corporate legal needs of those industries by developing contractual, common law, and statutory fixes as issues arose, on an as-needed basis.[15] U.S. technology prowess, derived from universities, corporations, and government research facilities, drove U.S. dominance of the global semiconductor and biotechnology industries; by and large, lawyers served as support staff to this industrial growth.[16] In a similar manner, U.S. universities, industry, and government currently dominate global research and development in environmental science, technology, and management, as measured by funding, manpower, and research report metrics:

- *Universities*: American universities lead the international research community in many areas of renewable energy research—including biomass and biofuels—as well as environmental applications of biotechnology.[17]

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[14] *See* STERN, *supra* note 12, at 303, 540, 589.

[15] *See, e.g.*, Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1630–38 (2003).

[16] *See, e.g.*, Aryeh S. Friedman, *Law and the Innovative Process: Preliminary Reflections*, 1986 COLUM. BUS. L. REV. 1, 5 (discussing the American dominance of trade in new technologies).

[17] *See, e.g.*, JUNFU ZHANG & NIKESH PATEL, THE DYNAMICS OF CALIFORNIA'S BIOTECHNOLOGY INDUSTRY 11–12 (2005) ("The biotech industry . . . relies on research universities as a source of technological innovation.").

- *Industry*: U.S. industry, including industrial consortium research centers, maintain leadership positions in the commercialization of recyclable materials, bioplastics, and clean water technologies.[18]
- *Government*: U.S. government laboratories continue to pioneer advances in photovoltaics, fuel cells, and the control of GHGs.[19]

In the case of the global EMTS industry, however, although much of the world's basic EMTS technology finds its home in the United States, much of the commercialization of this U.S. technology is based within industrial countries within Asia, the EU, and in EU-dominated economies.[20] As described above, the U.S. EMTS industry generally employs a different business model as compared to much of the EMTS industry abroad. Early in the genesis of the semiconductor and biotechnology industries, U.S. business embraced a manufacturing technology model and existing intellectual property law to guide the capture, development, commercialization, and licensing of valuable research.[21] U.S. courts, experienced in intellectual property disputes in manufacturing arenas, such as consumer products and pharmaceuticals, quickly adapted existing law to create predictable legal rules under which both industries could expand and flourish.[22] By contrast, traditionally, much of the U.S. EMTS industry is based on trade secret and protected expertise commercialized within a consulting—not a manufacturing indus-

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[18] *See, e.g.*, Ramani Narayan, *Commercializing Technology: From Laboratory to the Marketplace—A Case Study of Starch-Based Biodegradable Plastics Technology*, *in* PARADIGM FOR SUCCESSFUL UTILIZATION OF RENEWABLE RESOURCES 78, 79 (David J. Sessa & Julious L. Willett eds., 1998).

[19] *See, e.g.*, The Unitized Regenerative Fuel Cell, http://www.llnl.gov/str/Mitlit.html (last visited May 1, 2008) (describing the role of Lawrence Livermore laboratories in development of fuel cells).

[20] *See, e.g.*, STERN, *supra* note 12, at 593 box 24.7.

[21] *See* ZHANG & PATEL, *supra* note 17, at 8–15 (describing the growth of the industries and differences between the information technology and biotechnology industries).

[22] *See* Burk & Lemley, *supra* note 15, at 1630–38; James M. Golden, *Biotechnology, Technology Policy, and Patentability: Natural Products and Invention in the American System*, 50 EMORY L.J. 101, 113 (2001). The authors note:

> Under the influence of a new federal appellate court and a series of legislative initiatives, patent law moved with the spirit of the day, producing doctrines and policies sufficiently "modern" to provide enforceable property rights in a substantial share of the purified natural substances that were biotechnology's most characteristic products.

Id.

try—model,[23] which does not draw equally as well on existing intellectual property law protection and guidance. Not surprisingly, much of the ongoing EMTS research and practice has not been captured through patent and other intellectual property mechanisms. This Article argues that American attorneys in corporate and governmental practices must be trailblazers for the EMTS industry, harnessing the existing legal infrastructure, including intellectual property, tax, and corporate law, to ensure that the EMTS industry can grow on a level playing field with corporate competitors in other industrialized countries. Development of the domestic EMTS industry furthers a national interest as vital as the development of the semiconductor and biotechnology industries.

I. Issue 1: Capturing Intellectual Property for the U.S. EMTS Industry

The semiconductor and biotechnology industries experienced booms in the 1970s, 1980s, and 1990s.[24] Much of the credit for that boom lies with American scientists and engineers. At the same time, however, they did not act in a vacuum. As summarized in Table 2, federal and state governments were also active during the genesis of these industries, enacting new legislation to protect U.S. semiconductor and biotechnology intellectual property generated by universities, government labs, and corporate research facilities. The Semiconductor Chip Protection Act of 1984 defined new intellectual property rules aimed to protect semiconductor chip designs.[25] The Biotechnology Process Patent Act of 1995 amended sections of the Patent Act "to make biotechnology processes that use or result in novel and nonobvious compositions of matter *per se* nonobvious under certain conditions," which was critical for those processes to qualify for patent protection.[26] State and local governments were also active in the growth and development of these industries by enacting legislation to establish state technology

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[23] *See, e.g.*, U.S. Census Bureau, U.S. Dep't of Commerce, Management, Scientific, and Technical Consulting Services: 2002, at 1 tbl.1 (2004) (describing the extent of the environmental consulting industry).

[24] *See* Michael E. Kamarck et al., *Biotech Manufacturing Grows Up: The Industry Is Now 30 Years Old, Is Undergoing an Important Transition*, Biopharm Int'l, Oct. 1, 2007, at 1–2, *available at* http://goliath.ecnext.com/coms2/gi_0199-7163275/Biotech-manufacturing-grows-up-the.html. *See generally* Friedman, *supra* note 16 (discussing the ability of intellectual property laws to address technological developments).

[25] *See* Semiconductor Chip Protection Act of 1984, 17 U.S.C. §§ 901–914 (2000); *see also* H.R. Rep. No. 98-781, at 1–4 (1984), *reprinted in* 1984 U.S.C.C.A.N. 5750, 5750–53.

[26] *See* Jeremy (Je) Zhe Zhang, In re Ochiai, In re Brouwer *and the Biotechnology Process Patent Act of 1995: The End of the* Durden *Legacy?*, 37 IDEA 405, 407 (1996).

parks and research centers, as well as consortia among state universities, federal entities, and industrial partners, to target and capture semiconductor and biotechnology intellectual property.[27]

Table 2: 1970s and 1980s—Federal/State Policy Labels These Industries as Vital Federal and State Interests

Government Created Legislation to Support Rapid Growth, and Dominance of the U.S. Industry:
•Federal Intellectual Property Assistance: Semiconductor Chip Protection Act of 1984 Biotechnological Process Patent Act of 1995
•State Initiatives: State Technology Parks, Research Centers
•State/Federal/Industry Consortia: Semiconductor Manufacturing Technology (SEMATECH) Association, California Biotechnology Consortium

Much of the U.S. EMTS industry, however, is based on trade secrets and individual know-how commercialized within a consulting, not a manufacturing, industry model.[28] Such business models do not easily fit within traditional legal regimes seeking to identify and protect intellectual property as part of the capitalization of business activities. Not surprisingly, much of the ongoing EMTS research and development within most U.S. corporations has not been captured through patent and other intellectual property mechanisms. Companies are thus forced to reinvent the same approaches within multiple industry sectors, resulting in the loss of economy and speed of innovation towards GCC/SD targets observed in corporations headquartered in the EU.[29]

While the U.S. Patent and Trademark Office (U.S. PTO) has published guidelines to fast track patent applications for EMTSs,[30] the underlying legal mechanics of patent protection must also be examined to create patent regimes addressing the unique nature and characteristics of EMTSs—just as similar regimes were developed and implemented to support the semiconductor and biotechnology industries. Table 3 summarizes some key starting points under existing U.S. law and intellectual property regimes to tailor in order to fast track the evolution of the U.S. EMTS industry to meet state and local GCC/SD targets as identified in recent state and regional legislative initiatives.

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[27] *See* ZHANG & PATEL, *supra* note 17, at 1, 101–04 (providing examples in the biotechnology industry).

[28] *See* U.S. CENSUS BUREAU, *supra* note 23, at 1 tbl.1, app. B.

[29] *See* STERN, *supra* note 12, at 269–74.

[30] *See* 37 C.F.R. § 1.102(c)(2)(i)–(ii) (2007).

Table 3: U.S. EMTS Industry Issues/Needs—Intellectual Property

U.S. PTO: Build on Fast-Track Patent Review/Approval by U.S. PTO:
•Reconsider interpretations of obviousness/novelty requirements for EMTS patents
•Greater approval of EMTS research and development (R&D) elements as patentable products/processes
U.S. PTO: Broader Acceptance of Business Method Patents for EMTS such as:
•ISO14000-based management systems
•LCA systems
Industry and Government: Promotion of industry-established service/certification marks for products/companies employing EMTS and specific low-carbon technologies in product design, manufacturing, and distribution

First, EMTS could be considered for greater patent protection by modifying the approach provided to biotechnology process systems in the Biotechnology Process Patent Act of 1995.[31] Under such an approach, existing EMTS practices—whether engineering and scientific practices or facility/site management practices—which use or result in novel and nonobvious EMTS elements employed in business and industry could be considered per se nonobvious under specified conditions. Corporate research and development programs, which create EMTS elements targeted to address specific environmental management issues in specific industries, could be reconsidered as patentable products and processes. This approach to EMTS intellectual property would have a twofold effect:

- Much of the intellectual property currently employed within medium- to large-scale industrial facilities could be made available to smaller corporations—particularly startup entities—under normal licensing agreements. Such a development would advance GCC/SD goals by allowing new companies to build their products and processes from the start employing the latest EMTS available, thus increasing the likelihood they achieve even greater EMTS targets as these new firms grow and develop.
- Innovative firms that wish to initiate R&D programs to create their own EMTSs would have greater access to investment capital to support such programs because the fruits of these R&D programs could generate a licensing revenue stream.

Second, business method patents (BMPs) offer existing legal means under which EMTSs developed by U.S. businesses can be captured and promoted within the global marketplace. BMPs are patents

[31] *See* Biotechnology Process Patent Act of 1995, 35 U.S.C. § 103(b) (2000 & Supp. 2005).

for processes or methods for conducting or operating a business activity.[32] Any such process or method is potentially patentable so long as it is not an unapplied abstract idea or concept.[33] For example, a growing number of U.S. businesses have created and implemented an ISO 14000-based environmental management system (EMS) as an outgrowth of their development and implementation of ISO 9000 quality management systems.[34] The ISO 14000 standard series is the first international standard for voluntary environmental management by which corporate and governmental organizations can meet internal and external environmental targets and objectives. Elements of the ISO 14000 standards ensure that organizations adopting sound environmental management strategies realize improved environmental performance.[35] These EMS standards have not replaced state and federal environmental regulations, but act as complements to these regulations by integrating governmental requirements with ongoing and long-term business activities.

While hundreds of U.S. corporations invested significant resources into the implementation of such EMSs, intellectual property regimes such as BMPs have not been employed by these corporations to capture the intellectual property created in their design of ISO 14000 EMSs. Without this reward, developers lack incentive to make their designs public and thus available to other businesses in their industry through licensing programs. Currently, an EMTS consultant stands to make more money redesigning and custom fitting the same EMTS, but lacks a means to capture the potential gains of mass marketing.

One such example is the Murray Corporation, a manufacturer of power lawn equipment.[36] Murray created an ISO 14000-based EMS that

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[32] *See* State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368, 1375–77 (Fed. Cir. 1998).

[33] *Id.*; *see* Robert C. Kain, *Business Method Patents—Defining Your Viewpoints and Your Rights*, 80 FLA. B.J., Apr. 2006, at 40; *see also* U.S. PATENT & TRADEMARK OFFICE, A USPTO WHITE PAPER, AUTOMATED FINANCIAL OR MANAGEMENT DATA PROCESSING METHODS (BUSINESS METHODS) 5, *available at* http://www.uspto.gov/web/menu/busmethp/whitepaper.pdf.

[34] *See* International Organization for Standardization, ISO 14000 Essentials, http://www.iso.org/iso/iso_14000_essentials (last visited May 1, 2008) (describing the purpose of ISO 14000 and its different elements).

[35] *See id.*

[36] *See* TENN. POLLUTION PREVENTION ROUNDTABLE, 1998 REPORT: POLLUTION PREVENTION SUCCESS STORIES 19 (1998), *available at* http://www.p2pays.com/ref/26/25690.pdf. One of the authors of this Article directed the development of the Murray EMS. T. Rick Irvin, Phillip R. Hood & Nelson R. Webb, Development of ISO14001-Based Environmental Management System to Meet EU Vendor Requirements 10–21 (Mar. 16, 2007) (unpublished manuscript, on file with authors).

set internal, self-appointed timelines to identify and minimize toxic chemical usage and waste generation at its manufacturing sites.[37] This EMS was developed, in part, to codify Murray's environmental performance and satisfy the requirements from European vendors that had instituted aggressive environmental and toxic chemical benchmarks for all approved vendors.[38] With an EMS in place that coordinated new product design functions with input from environmental and facility management staff, toxic chemical-intensive finishes and lubricants and energy-intensive processes could be intercepted while a new product was still at the drawing board.[39] While Murray—like other corporations that develop ISO 14000-based EMSs—created the needed codification of their environmental performance as part of their vendor certification process, no intellectual property regimes could be accessed to capture the information and knowledge developed during construction of the EMS and create a product that could be licensed to other firms in their industry.[40] In addition, no program was in place that formally recognized Murray's implementation of an ISO 14000-based EMS as part of an industry- or government-established certification mark system for products employing low-toxic and low-carbon technologies during design, manufacturing, and distribution.[41]

Such refinements and updates of U.S. intellectual property law would promote the transition of key components of the U.S. EMTS industry to a manufacturing industry model with the coordinate benefit of allowing the EMTS industry better access to existing U.S. contract and tort law to promote the growth of technology commercialization in these disciplines. In addition, such intellectual property law refinements would facilitate achieving many large-scale sustainable develop-

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[37] *See* Tenn. Pollution Prevention Roundtable, *supra* note 36, at 19; Irvin, Hood & Webb, *supra* note 36, at 10–21.

[38] *See, e.g.*, B&Q Online: From Kitchens & Bathrooms to Sheds & Paving: Plus Planning Tools, Social Responsibility, http://www.diy.com/diy/jsp/bq/templates/content_lookup.jsp?content=/aboutbandq/social_responsibility_2007/environmental_main.jsp&menu=aboutbandq (last visited May 1, 2008). For example, the B&Q do-it-yourself (DIY) chain in the United Kingdom has established firm environmental benchmarks and guidelines for all suppliers. *Id.* As a vendor of lawn equipment, Murray had to meet these goals or could not sell its equipment at B&Q stores. *See id.*

[39] *See* Tenn. Pollution Prevention Roundtable, *supra* note 36, at 19; Irvin, Hood & Webb, *supra* note 36, at 10–21.

[40] *See* Tenn. Pollution Prevention Roundtable, *supra* note 36, at 19; Irvin, Hood & Webb, *supra* note 36, at 10–21.

[41] *See* Tenn. Pollution Prevention Roundtable, *supra* note 36, at 19; Irvin, Hood & Webb, *supra* note 36, at 10–21.

ment objectives, announced by the United States and other governments, in the shortest period of time.

II. Issue 2: U.S. Corporate Taxation Law Supporting the EMTS Industry: Harnessing Federal and State Tax Law to Accelerate Low-Carbon Technologies

Regional and national initiatives have created significant market advantages for non-U.S. EMTS industries. The EU and Japan have announced significant—and aggressive—market-based initiatives to accelerate growth of their native EMTS industries.[42] These initiatives include targeted government purchase of selected EMTS goods and services and selective tax treatment of specific EMTS industries.[43] Such actions, including targeted tax initiatives, not only create large internal markets for new EMTS products and services, but also provide a rich incubator facilitating basic research commercialization—an incubator not currently available or under development for many emerging U.S. EMTS businesses.

Through incremental authorizations under the existing tax code, the Internal Revenue Service could affect the tax treatment of EMTS research, development, implementation, acquisition, and commercialization under existing regulations and other administrative activities.[44] These possible changes, summarized in Table 4, can enhance the rapid adoption of environmentally beneficial technologies within the U.S. marketplace. Federal agencies alone, or through targeted authorized annual spending programs, could cost-share purchase or tax deductibility of low-carbon replacement technology as older industrial facilities accelerate the replacement of current high-energy, high-carbon technology in the coming years. Similarly, the federal government could accelerate corporate depreciation of EMTS equipment to promote faster corporate reinvestment in low-carbon technology and, in turn, accelerate the progress of GCC/SD targets within specific industries. Lastly, federal tax benefits to corporations that purchase targeted EMTS goods, services, equipment, and technology would provide U.S. EMTS firms with an incubator market within which U.S. firms could grow and prosper as a predicate to competing within the global marketplace.

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[42] *See* Stern, *supra* note 12, at 347–66.

[43] *See id.*

[44] Examples of similar tax treatment include the tax treatment of energy-efficient building expenditures and alternative motor vehicles. *See* I.R.C. § 25C (West Supp. 2006) (energy-efficient building expenditures); I.R.C. § 30B (West Supp. 2006) (alternative motor vehicles).

Table 4: U.S. EMTS Industry Issues/Needs—Federal Tax Law

Necessary alterations to federal tax law:
•Broader deductibility of low-carbon replacement technology
•Accelerate depreciation of U.S. EMTS equipment
•Greater tax benefits for purchasing targeted U.S. EMTS goods, services, equipment, or technology to create needed internal U.S. markets

Similarly, tax programs at the state and local level that reward development and commercialization of new intellectual property and the concomitant growth of jobs can provide support structures for EMTS commercialization. Similar support structures aided growth during the birth of the American semiconductor and biotechnology industries.[45] As summarized in Table 5, state and local governments could employ targeted tax credits and tax abatements to provide local economic stimulus to existing industries and startup businesses that renovate their products and processes to meet GCC/SD goals. States could adopt tax programs linked to the adoption or commercialization of EMTS intellectual property developed by state universities and research centers, commercialized in planned environmental technology parks, or developed by state or local development authorities. State and local governments could institute corporate tax credit programs available to corporations that purchase targeted EMTS goods, services, equipment, and technology to create local and regional incubator markets for startup EMTS firms. This market-enhancing approach is not new; many states have successfully followed this path and created targeted incentives that in turn fostered local venture capital for business formation in semiconductor and biotech industries. For instance:

> States such as Florida, New York, and Texas give tax credits to insurance companies if they invest in certified capital companies. Others such as Arizona and South Carolina directly offer tax credits to venture capital firms. Residents in states such as Iowa, Kansas, and Oklahoma get tax credits for investments in qualified venture capital funds.[46]

Table 5: U.S. EMTS Industry Issues/Needs—State Tax Law

States should implement:
• Targeted tax credits and tax abatements for capital purchases of low-carbon EMTS goods, services, and equipment
• Tax programs to promote joint university-corporate EMTS R&D and commercialization
• Greater tax benefits for purchasing targeted U.S. EMTS goods, services, equipment, and technology to create needed local/regional incubator U.S. markets

[45] *See, e.g.*, ZHANG & PATEL, *supra* note 17, at vii–viii (discussing the biotech industry).
[46] *Id.* at 102–03.

In addition, state technology initiatives, recognized as successful contributors to the growth of the semiconductor and biotechnology industries, provide a number of proven industrial growth strategies, which can be readily adapted to lay the foundation for parallel growth of the U.S. EMTS industry.[47] Many states have created funds targeted at the semiconductor and biotechnology industries' special needs, such as funds for building modern research labs and facilities or venture capital for startup firms.[48] Such programs can be duplicated in the near term—six to twelve months—to jump start nascent U.S. EMTS businesses. Specific programs well recognized as leaders in state initiatives for both industries include Wisconsin, Arizona, and Texas initiatives.[49] Each state spends hundreds of millions of dollars on engineering and life science facilities at state university campuses for collaborative, joint-venture activities.[50] New York, California, Texas, and Colorado constructed research parks and technology transfer incubator facilities for nascent semiconductor and biotechnology firms.[51] Connecticut and North Carolina created state investment funds targeted at startup technology firms.[52]

State governments can also streamline technology transfer from academic institutions to the EMTS industry with incentives to encourage technology transfer from universities to businesses.[53] State and local governments can sponsor EMTS incubators near major research institutions to help accelerate the commercialization of EMTS through entrepreneurship between the university and business communities.[54] A highly educated labor force is needed for the U.S. EMTS industry to compete in the global marketplace; state initiatives can meet this need through targeted special programs within state higher education systems, as they have for the semiconductor and biotechnology industries.

One recent well-advertised state initiative to attract, incubate, and establish a new technology-based industry is the California Stem Cell Research and Cures Bond Act.[55] Adopted as Proposition 71 in November 2004, this state initiative authorized California to provide an aver-

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[47] *See id.* at 1–4, 101–02.

[48] *Id.* at 104–08.

[49] *Id.* at 104.

[50] *Id.*

[51] ZHANG & PATEL, *supra* note 17, at 104, 105–06 tbl.6.7.

[52] *Id.* at 104.

[53] *See id.* at 113 (summarizing efforts by three University of California campuses to form an incubator for biotech research).

[54] *See id.*

[55] *See* CAL. HEALTH & SAFETY CODE § 125291.10–.85 (West 2004).

age of $295 million per year in bonds over ten years to fund stem cell and medical research facilities in California.[56] Stem cell research is expected to provide the next generation of cures for devastating diseases such as Alzheimer's and Parkinson's.[57] Of particular note is that, as of 2003, the annual funding available in California for stem cell research was greater than the amount of funding available for similar research by the federal government.[58] Comparable state tax and funding initiatives on the size and scale of the California stem cell initiative, modeled on earlier California initiatives for semiconductor and biotechnology initiatives, will be needed for the U.S. EMTS industry to achieve global dominance on the scale of earlier high-tech and biotech firms.

Just how significant an impact such state and local initiatives could provide to promote the growth and dominance of U.S. EMTS businesses can be demonstrated by looking at case studies describing how state and local governments have encouraged growth and retained firms in the biotechnology industry. In 1994, San Francisco-based biotech pioneer, Genentech, located a new, quarter-billion-dollar manufacturing plant in Vacaville, about sixty miles from its existing locations.[59] Genentech's decision was based in part on California's incentive package which included:

- state R&D tax credits;
- a state investment tax credit worth up to $6 million;
- a $3.2 million federal economic development grant;
- a $10 million state grant for retraining workers;
- a $4 million property tax rebate by local government;
- a waiver of $1.8 million in permit fees and sewer costs; and
- discounted long-term energy contracts.[60]

California and Vacaville's investments reaped tremendous economic benefits; Genentech subsequently constructed an additional $600 million expansion, making Vacaville the location of one of the largest biotech drug manufacturing locations in the world.[61] State tax initiatives of this size and scale will be needed for the U.S. EMTS industry to achieve the power needed to compete with, and dominate, global EMTS competitors and markets. The same growth potential harnessed by state and

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[56] *Id.* (originally adopted as CA Prop. 71 (2004)).
[57] ZHANG & PATEL, *supra* note 17, at 116.
[58] *Id.*
[59] *Id.* at 108.
[60] *Id.* at 109.
[61] *Id.* at 109 n.10.

local government, as seen in their support of the semiconductor and biotechnology industries, therefore, provides proven tax program strategies by which U.S. EMTS firms can receive the financial support needed, not only to grow and prosper, but also to take over global EMTS markets at a level comparable to that seen by the U.S. semiconductor industry in the 1980s and the U.S. biotechnology industry in the 1990s.

III. Issue 3: Limits to Corporate Environmental/Operational Disclosures: Securities Exchange Commission Regulation Fair Disclosure

The success or failure of GCC/SD initiatives will be determined in part by the ability of governments and third-party nongovernmental organization certifiers, such as Ceres[62] and the Carbon Disclosure Project (CDP),[63] to access information about the extent of a corporation's environmental footprint, including carbon emissions. Current federal regulations, however, have either proscribed the ability of U.S. corporations to disclose critical corporate operational and product information needed to formulate and implement GCC/SD initiatives, or have provided explanatory cover for corporations wishing to avoid such disclosure.

One example is the ability of third-party organizations to obtain information about carbon emissions from publicly traded corporations. Such data are crucial to determine everything from the establishment of a baseline of regulation to the measurement of environmental performance. Nevertheless, recent responses that CDP received from American corporations demonstrate perceived impediments, and show a reluctance by some corporations to participate in such monitoring and data-collection efforts.[64] For example, the 2006 CDP response from the John Deere Corporation of Moline, Illinois reads in part: "[W]e receive many such detailed requests on an ongoing basis from investors, rating groups, socially conscious organizations, academics and

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[62] Ceres is a network of environmental, investor, and advocacy groups. Ceres—Home, http://www.ceres.org (last visited May 1, 2008).

[63] Carbon Disclosure Project: Homepage, http://www.cdproject.net (last visited May 1, 2008). The CDP is a nongovernmental, independent organization that works with corporations and their shareholders to disclose environmental information, including GHG emissions, for public review. As of March 2008, the CDP represented major institutional investors with a combined $57 trillion under their management. *Id.*

[64] *See, e.g.*, Letter from Mark A. Howze, Corp. Sec'y & Assoc. Gen. Counsel, Deere & Co., to Daniel Turner, Project Officer, Carbon Disclosure Project (May 31, 2006), *available at* http://www.cdproject.net/download.asp?file=CDP4_Deere_IN_FT500.pdf.

others. You also may be aware of federal Regulation FD, which prohibits companies such as Deere from selectively providing information."[65]

Securities Exchange Commission (SEC) Regulation Fair Disclosure (Regulation FD) was issued in 2000 to prevent selective disclosure of material, nonpublic information to securities professionals, industry analysts, and institutional investor organizations *before* that information is disseminated to the general investing public.[66] Selective disclosure of corporate information material to the investment community could unfairly benefit financial and investment professionals at the expense of noninstitutional purchasers of particular corporate securities.[67] Regulation FD removed this potential selective benefit by regulating how public companies must disclose material, nonpublic corporate information to members of the securities and investment community.[68]

Corporations laboring under this reading of Regulation FD may be misreading the reach of the rule. Regulation FD requires issuers to make prompt disclosure to the public of material, nonpublic information whenever they make an intentional or inadvertent disclosure of that information.[69] In taking the position that Regulation FD applies to their environmental information, companies that demur from cooperating with GCC/SD-related information gathering efforts believe such information to be *material*, which is an arguably correct interpretation of the regulation. However, corporations may have read too much into Regulation FD. Regulation FD does not prevent corporate officers from providing experienced securities analysts and senior shareholder and investor representatives with corporate information that alone is not material information, but from which experienced securities professionals could extract key environmental and operational performance

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[65] *Id.*

[66] 17 C.F.R. §§ 243.100–.103 (2007); *see also* Selective Disclosure and Insider Trading, 65 Fed. Reg. 51,716, 51,716 (Aug. 24, 2000). The Selective Disclosure and Insider Trading regulation states:

> We believe that the practice of selective disclosure leads to a loss of investor confidence in the integrity of our capital markets. Investors who see a security's price change dramatically and only later are given access to the information responsible for that move rightly question whether they are on a level playing field with market insiders.

Id.

[67] *See* 65 Fed. Reg. at 51,716.

[68] *See* 17 C.F.R. § 243.101(e).

[69] *Id.* § 243.100(a).

data.[70] Moreover, Regulation FD does not prevent disclosure provided it is made to the public.[71]

At the same time, U.S. corporations have reason to tread carefully when considering whether disclosures of environmental and operational data triggers the reporting requirements of Regulation FD. Failing to comply with any element of Regulation FD creates immediate exposure to SEC enforcement actions.[72] False or misleading statements or omissions made pursuant to Regulation FD remain actionable under Rule 10b-5—the general corporate anti-fraud rule which governs material misrepresentations made with respect to the sale of securities in a public, as well as a private, corporation—although the SEC has provided within the regulation that failure to make a disclosure will not result in 10b-5 liability if the disclosure is required solely by Regulation FD.[73] In addition, a company can be liable under Regulation FD if it:

- knows of or is reckless in not knowing that information selectively communicated is both material and nonpublic;
- fails to disseminate such information in a prompt manner; or
- fails to employ reasonable methods in order to make broad, nonexclusionary disclosures of material, nonpublic information.[74]

Possible SEC remedies include issuance of a cease and desist order, and civil actions seeking an injunction and/or civil monetary penalties.[75] Individuals, including corporate officers, deemed responsible for Regulation FD violations can personally be subject to SEC actions as either "a cause of" the violation or as an "aider and abetter" of such violations.[76] Potential Regulation FD violations can substantially affect the value of that corporation's securities, as well as possibly limit the ability of individuals to continue as members of corporate management.[77] Therefore, it is not unreasonable that major corporations, like Deere, which depend on the securities markets for ready access to investment capital,

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[70] *See* 65 Fed. Reg. at 51,722 ("At the same time, an issuer is not prohibited from disclosing a non-material piece of information to an analyst, even if, unbeknownst to the issuer, that piece helps the analyst complete a 'mosaic' of information that, taken together, is material.").

[71] *See id.* at 51,719 (stating that Regulation FD "encourages broad public disclosure").

[72] *See id.* at 51,726 (outlining possible SEC enforcement responses).

[73] 17 C.F.R. § 243.102.

[74] *Id.* §§ 243.100–.101.

[75] 65 Fed. Reg. at 51,726.

[76] *See id.*

[77] *Id.* at 51,725; *see* Jon Jordan, *Corporate Issuers Beware:* Schering-Plough *and Recent SEC Enforcement Actions Signal Vigorous Enforcement of Regulation FD*, 58 U. Miami L. Rev. 751, 803–06 (2004).

might sensibly err on the side of caution rather than participate in activities that may create liability in light of these potential SEC actions.[78]

Simple guidance from the SEC or an interpretive rule—which under the terms of the Administrative Procedure Act would not even require notice and comment[79]—can rectify this situation. The SEC has already provided guidance to Regulation FD,[80] and in the rule itself announced that a failure to disclose information required solely by Regulation FD would not result in liability.[81] Although the desire for investors to compete on a level playing field is laudable, regulated corporations can use the additional assurance from the SEC that other laudable activities will not result in unpredictable liability. Such increased information will allow private entities to further activities that promote GCC/SD efforts without extensive governmental involvement.

Conclusion

GCC/SD initiatives by the EMTS industry, as well as by state and local governments, are testing the creativity possible in law on an almost daily basis. The legal academy continues to propose new legal theories addressing the use of comprehensive, national and international legal systems to reverse the impacts of global climate change through enhanced regulation of high-carbon technologies and their associated GHG emissions. Practicing corporate and regulatory lawyers at the same time are grappling with these proposed new legal regimes and jurisprudential theories targeting the transition of all sectors of the U.S. economy from a high-carbon to a low-carbon technology base.

Each of these legal strategies share a common ingredient: they attempt to solve a large global problem using almost exclusively large, global legal approaches. Even proposed state and local responses often try to achieve a global solution. Absent from much of the current GCC/SD legal debate within both business and government are legal approaches founded on mature, small, incremental legal initiatives that

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[78] *See* Letter from Mark A. Howze, *supra* note 64.

[79] *See* Administrative Procedure Act, 5 U.S.C. § 553(b)(A) (2000).

[80] SEC, Division of Corporate Finance: Manual of Publicly Available Telephone Interpretations, http://www.sec.gov/interps/telephone/phonesupplement4.htm (last visited May 1, 2008).

[81] *See* 17 C.F.R. § 243.102 (2007). Institutional investors, including the California Public Employees' Retirement System, and environmental organizations filed a petition seeking a rulemaking requiring corporations to disclose risks presented by GCC. *See* Petition for Interpretive Guidance on Climate Risk Disclosure, No. 4-547 (filed Sept. 18, 2007), *available at* http://www.sec.gov/rules/petitions/2007/petn4-547.pdf. That petition does not raise the issue with Regulation FD described in the text.

can result in near-term GCC/SD and GHG improvements. Tactically, smaller and less obvious legal approaches in support of GCC/SD initiatives will be important to the legal community for at least three reasons: economics, facility in policy design, and the treatment of new entrants to the market.

Economically, smaller, incremental legal initiatives to change laws governing GHGs are far less resource-intensive in terms of time, effort, and money for nongovernmental and governmental legal organizations. Reductions in GHG emissions can be achieved through small, incremental legal systems with greater speed and efficiency than large-scale legal initiatives, global in scale.

From a policy design perspective, smaller, incremental legal initiatives, which can progress with greater speed through the courts and administrative law venues, can provide useful clues in the short-term to calibrate how resistant existing legal systems will be to initiatives targeting GCC/SD and GHG emission regulation.

Finally, smaller, incremental legal initiatives can take advantage of new, emerging participants who are now key players in how the U.S. EMTS industry will respond to emerging GCC/SD initiatives. Groups such as Ceres now provide attorneys and investment managers in both corporate and governmental practices with new information and technology exchange options not previously available as tools to fashion corporate, industry, or local and state EMTS initiatives.

Many in the regulatory community and legal academy believe that years, if not decades, are available to sort out how U.S. industry and government should create legal and regulatory strategies to address GCC/SD initiatives. They presume the end-product of this process will be major new U.S. legislation, as was created to deal with prior initiatives on air, water, and industrial wastes. They also believe that U.S. industry and government have the luxury of a long-term horizon to respond to GCC/SD-related environmental concerns, because U.S. research dominance leads many to expect U.S. businesses will inherit an equally dominant position in the ongoing expansion of global EMTS industries. While the United States enjoys a leadership role in many expanding technology-based industries—such as the biotechnology and semiconductor industries—several dynamics of U.S. and global EMTS industry growth portend U.S. industries will be at a selective disadvantage competing with non-U.S. EMTS industry participants in current markets, and a similar selective disadvantage commercializing EMTS research into new products and services.

This Article has posited that the success of the U.S. EMTS industry—compared to the success of the U.S. biotechnology and semicon-

ductor industries—requires an immediate, critical examination of current U.S. law to enable market-based and regulatory incentives that promote the U.S. EMTS industry and positions U.S. industry to compete with equal strength against global competitors in global markets. The evidence to date clearly indicates that the legal community, as a needed partner to the environmental science and engineering disciplines, will play a significant role in guiding the rate of growth and market dominance of the U.S. EMTS industry in the global marketplace. The three areas of the law examined here—corporate law, intellectual property law, and tax law—provide clear examples of how current U.S. federal and state law, absent any new major legislative initiatives, can promote the U.S. EMTS industry to global success and predominance on par with the level of global commercial success of the U.S. semiconductor and biotechnology industries. In addition, we have provided examples of short-term applications of existing U.S. statutory and common law that attorneys in corporate and governmental practices can utilize to position companies, industries, states, or regions of the United States to become dominant actors in the development of the EMTS industry comparable to the dominance of U.S. corporations and governmental agencies in creating U.S. market dominance in the semiconductor and biotechnology industries in the 1970s, 1980s, and 1990s.